Filter Bag-out Technology

Introduction

The current plan for technical innovation is expected to bring about the 2006 closure goal, but Rocky Flats personnel are keenly interested in identifying and implementing new technologies that will further improve performance in terms of schedule, cost, safety, and protection of human health and the environment.

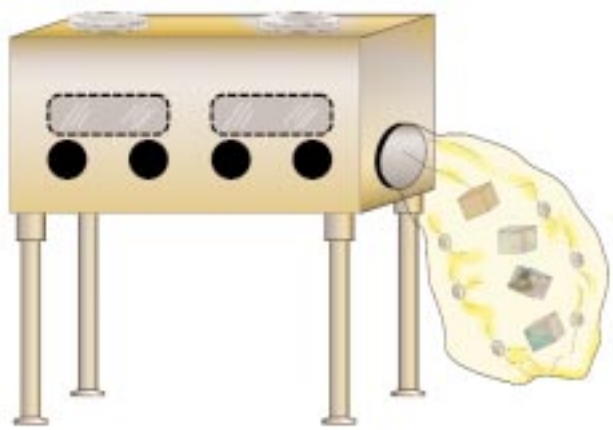
One innovative technology that Rocky Flats is implementing is the use of filtered plastic bags (called bag-out bags) as a means to achieve a more cost-effective disposal of combustible residues at the Waste Isolation Pilot Plant (WIPP).

Combustible residues are radioactive and chemically contaminated materials such as paper, cloth, and plastic that can ignite relatively easily. The mixture of plutonium and such materials has the potential to generate hydrogen gas when placed into waste containers, which is a concern because of its explosive nature. To ensure that hydrogen buildup does not reach explosive levels, WIPP has set limits on how much plutonium can be present in a single waste container. This is called the "wattage limit." The amount of hydrogen buildup is directly related to the amount of plutonium present in the waste container.

Before the use of filtered bags, the wattage limit restricted the amount of radioactive material that could be packaged in WIPP-bound containers to only a fraction of the capacity of a drum. To solve this packaging dilemma, Rocky Flats has initiated the use of the filtered bag-out bags to increase the wattage limit and thus the amount of radioactive materials that can be safely allowed in each drum. The bags contain small filters that effectively hold the radioactive material but release hydrogen gas. As a result, four times the payload is allowed per drum, which means far fewer drums need to be sent to WIPP. The direct cost savings to the taxpayer has been estimated at $24 million, plus indirect savings from schedule acceleration. There are similar direct savings at many other sites.

Problem

The conventional method for storage and disposal of combustible residues was to use a standard bag that did not contain filters. When using a standard storage bag, the accumulation of hydrogen gas presents a potential safety hazard during storage, shipping, and disposal. Therefore, the amount of radioactive material allowed in each drum was greatly limited in order to keep hydrogen buildup at safe levels. Typically, only about one kilogram of combustible residue could be packaged in a waste drum before the wattage limit was exceeded, resulting in an excessively large number of drums to store and eventually ship.



Filter Bags as a Solution

The bag filter was developed at the U.S. Department of Energy's Savannah River Site as a size reduction method. Savannah River reasoned that removing the air could greatly reduce the volume of each bag. Once each waste bag is full, it is sealed, and a vacuum source is attached to the high-efficiency particulate air (HEPA) filter. The air is removed from inside each bag using the vacuum pump, but the particulate contamination remains inside the bag because of the HEPA filter. The result is a waste package having far less volume than the bag as originally filled.

In 1995, Rocky Flats set out to modify the concept for a different application that would significantly reduce costs associated with combustible residues and make the work safer at the same time. The Rocky Flats design was the opposite in function of the original concept. The main issue was not volume of matter in each bag, but the amount of plutonium allowed in each bag. The use of a multi-filtered bag meant more waste material, containing more plutonium, could be packaged in a waste drum while maintaining the hydrogen concentrations below the limits set by WIPP. As a result, the number of waste drums expected from the treatment and repackaging of combustible residues could be dropped from 16,000 to 4,000. Not only will far fewer drums be sent to WIPP, but millions of cleanup dollars can be reallocated to other cleanup priorities.

How Does It Work

The filtered bags contain small, disk-like HEPA filters, which are extremely effective in containing radioactive particulate material but allow for the hydrogen gas to escape. A HEPA filter is a highly efficient air filter made from carbon. For the Rocky Flats design, waste content is maximized, yet hydrogen build-up continues to be minimized over time.

As an extra precaution, the bag-out bag will be placed into a second bag, made from polyethylene. This bag will also have HEPA filters. The bags containing the combustibles will be placed into a HEPA filtered 55-gallon transuranic waste drum and sent to WIPP for ultimate disposal.

Conclusion

Rocky Flats is actively pursuing and implementing technologies that will enhance performance toward closure. The filtered bag-out bag is one technology that will not only improve project schedule because fewer drums will be generated, it will also save more than $24 million at Rocky Flats alone.

In February 1997, the U.S. Nuclear Regulatory Commission approved filtered bag-out bags for transuranic materials destined for WIPP. A Colorado small business has been contracted to produce filtered bags to Rocky Flats specification.

U.S. Department of Energy

Make It Safe. Clean It Up. Close It Down.

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For further information about Rocky Flats

*Contact DOE Communication at (303) 966-5993, or Kaiser-Hill Communication at (303) 966-2882, or toll free at (800) 269-0157 (press *82882# when you hear the automated attendant)*

Also, additional information about Rocky Flats is available on the internet at: http://www.rfets.gov

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